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Question: Problem 2.12 Let A, B, and C be three subsets of a universe U wi...



Problem 2.12

Let A, B, and C be three subsets of a universe U with the following properties: $n(A) = 63, n(B) = 91, n(C) = 44, n(A \cap B) = 25, n(A \cap C) = 23, n(C \cap B) = 21, n(A \cup B \cup C) = 139$. Find $n(A \cap B \cap C)$.

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Expert Answer



JYOTIRANJAN answered this
646 answers

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Given that A, B and c are three subset of a universe U. Also given that $n(A) = 63, n(B) = 91, n(C) = 44, n(A \cap B) = 25, n(A \cap C) = 23, n(C \cap B) = 21, n(A \cup B \cup C) = 139$. We have to find $n(A \cap B \cap C)$.

Firstly we derive the formula for $n(A \cup B \cup C)$.

$$n(A \cup B \cup C) = n\{(A \cup B) \cup C\}$$

$$= n(A \cup B) + n(C) - n\{(A \cup B) \cap C\}$$

$$= n(A) + n(B) - n(A \cap B) + n(C) - [n\{(A \cap C) \cup (B \cap C)\}] \quad (\text{by the property of set theory})$$

$$= n(A) + n(B) + n(C) - n(A \cap B) - [n\{(A \cap C) \cup (B \cap C)\}]$$

$$= n(A) + n(B) + n(C) - n(A \cap B) - [n(A \cap C) + n(B \cap C) - n(A \cap B \cap C)]$$

$$= n(A) + n(B) + n(C) - n(A \cap B) - [n(A \cap C) + n(B \cap C) - n(A \cap B \cap C)]$$

$$= n(A) + n(B) + n(C) - n(A \cap B) - n(A \cap C) - n(B \cap C) + n(A \cap B \cap C)$$

Hence

$$n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(A \cap C) - n(B \cap C) + n(A \cap B \cap C)$$

We have to use the above formula for the



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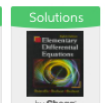
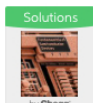
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given problem

now,

$$n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(A \cap C) - n(B \cap C) + n(A \cap B \cap C)$$

$$\Rightarrow 139 = 63 + 91 + 44 - 25 - 23 - 21 + n(A \cap B \cap C)$$

$$\Rightarrow 139 = 198 - 69 + n(A \cap B \cap C)$$

$$\Rightarrow 139 = 129 + n(A \cap B \cap C)$$

$$\Rightarrow n(A \cap B \cap C) = 139 - 129 = 10$$

$$\Rightarrow \boxed{n(A \cap B \cap C) = 10}$$

(Ans)
Thank You.

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Are the following functions even or odd or neither even nor odd $\tan(2x)$ Choose... $f(x) = \sin(3x) \cdot \sin(2x)$ Choose... $f(\dots)$

[See answer](#)

B5. a. Given $F = (2x^2y, 4y^2z, 8z^2)$. Find $\nabla \cdot F$ and $\nabla \times F$. b. Taking $F = (F_x, F_y, F_z)$, prove the following vector identity $\nabla \cdot (\nabla \times F) = 0$

[See answer](#)

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Q: Question 1 Let A, B, C be three subsets of a universe U with the following properties: $n(A) = 63$, $n(B) = 91$, $n(C) = 44$, $n(A \cap B) = 25$, $n(A \cap C) = 23$, $n(B \cap C) = 21$, $n(A \cup B \cup C) = 138$. Find $n(A \cap B \cap C)$.

A: [See answer](#)

Q: Let A, B, and C be three subsets of a universe S with the following properties: $N(A) = 87$, $N(B) = 87$, $N(C) = 54$, $N(A \cap B) = 16$, $N(A \cap C) = 15$, $N(C \cap B) = 14$, $N(A \cup B \cup C) = 209$. Find $N(A \cap B \cap C)$.

A: [See answer](#)

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